

Cabling 101

This is specifically about making Ethernet cables but a lot of this will likely apply to most types of low voltage/data cables.

So, there are standard pinouts and such that you can learn from Wikipedia and other places. I'm not going to bore you too much with the details of the various standards. Instead, I'm just going to make a few important points and give general advice on how to do it.

The first thing to know about Ethernet cable is that there are two types (note, I said types not standards) and they are Solid and Stranded.

Solid cables are used for permanent installs. They are designed to last a long time in a situation where they are stationary for several years. You run them in your walls, ceiling and floors. Solid cable should only ever be terminated with a keystone jack, punchdown block or patch panel. A keystone jack is the actual connector part of an Ethernet wall outlet. A punchdown block is an organizational tool, that can be used to do neat tricks for splicing cables, that is typically mounted to the wall near your networking equipment. A patch panel is another organizational tool that is typically mounted to a wall or inside a network rack as a convenient location to run patch cables to your networking equipment. For example, you might have a cable run that terminates at a keystone jack on one end in a random room and the other end on a punchdown block in your networking room. From there, you might connect the cable to another cable that terminates the other end in a patch panel in your network rack. From there, you would have a patch cable connecting the patch panel to a switch or router. That's pretty much the most complicated type of run you'll see. You are almost never going to see a punchdown block used in a residential setting. Most often, it is used to connect phone lines in an office building, hotel or other business. Rarely, you might see it used for networking cable but there isn't much practical use for it these days.

Why are phones special? You only ever connect one computer to one other computer with a single network cable. However, you can have a single phone line connecting to every phone in your house. How? That's what makes a punchdown block special. You can have a single phone line on one side spliced to a dozen lines on the other. So, when a call comes in over that one line, it rings every phone over that other side.

IMPORTANT: Do **not** place a patch panel in your network rack, if you plan to move your network rack around or if you will need to frequently change the location of where the cables are terminated. It's much better to just mount it to the wall and run your patch cables from there to your network rack.

Stranded cables are also called patch cables. They are designed to be flexible enough that you can disconnect/reconnect and move them around frequently. Patch cables should almost always be terminated with a mod (modular) plug on both ends. These are the cables that are used pretty much everywhere that isn't inside a wall, ceiling or floor.

When it comes to standards, the only one that is going to really matter these days in a residential situation is Cat 5e. It can handle everything up to 10 Gb at lengths that you are unlikely to exceed in your typical home. If you truly need a run that exceeds the limits of Cat 5e, you are better off running fiber in most cases, though you could probably get by with any variation of Cat 6 cable up to 10 Gb speeds. The problem with copper wire (Ethernet) is that it starts to hit a hard limit in its capacity around 10 Gb. Even using it for 10 Gb (regardless of the spec) is going to push its limits and cause it to get hot. I'd only really recommend Ethernet runs for 1 Gb, 2.5 Gb and 5 Gb. Since only 1 Gb and 2.5 Gb are really affordable for residential use, it's likely that fiber will be the better option by the time you would consider 10 Gb or faster speeds.

When it comes to the actual construction of Ethernet cables, it's fairly simple. To start with, you'll measure and/or run the cable and likely add a little extra to it. Then, you cut it and strip the insulation off the end. While you can use a knife and strippers for that, a nice pair of electrical scissors is going to be more efficient and effective, with a little practice. To strip the insulation, you merely need to score the outer insulation enough that you can yank it off. You'll then need to trim any inner insulation. Once you've done all that, it's time to line up the wires and insert them into either the mod plug or the punchdown device. For solid cables, you're going to be using a punchdown tool to punch the wires down into position and there's usually color coded guides for where to place them. For stranded cables, you'll be using a crimper to crimp mod plugs and lock the wires in position. Optionally, you may need to trim the wires either before or after inserting them into the mod plug. Some mod plugs have an opening to slide the wires out the other end and some don't. Punchdown tools automatically trim the excess wire when punching down. For bonus knowledge, check out the difference between a crossover cable and a straight through cable. You only need a crossover cable when connecting two computers directly to each other, without a switch or router in-between.

Note: Be sure to link wiki resources and pin out guides later.

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